

WHAT IS CLAIMED IS:

1. A storage-stable, liquid, partially trimerized and allophanized polyisocyanate having an NCO group content of 15 to 41% by weight, and comprising the partial trimerization and allophanation product of:
- 5 (A) from 5 to 85% by weight of toluene diisocyanate having an isomer distribution of:
- (1) from 60 to 100% by weight of the 2,4-isomer, and
- 10 (2) from 0 to 40% by weight of the 2,6-isomer, with the sum of the %'s by weight of (A)(1) and (A)(2) totaling 100% by weight of (A);
- and
- (B) from 5 to 85% by weight of a polyisocyanate of the diphenylmethane series comprising from:
- 15 (1) 0 to 50% by weight of higher functionality polyisocyanates of the diphenylmethane series,
- (2) 40 to 100% by weight of 4,4'-diphenylmethane diisocyanate,
- 20 (3) 0 to 20% by weight of 2,4'-diphenylmethane diisocyanate,
- and
- (4) 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,
- with the sum of the %'s by weight of (B)(1), (B)(2),
- 25 (B)(3) and (B)(4) totaling 100% by weight of (B);
- and
- (C) from 0.1 to 10% by weight of an organic compound or mixture thereof containing from 1 to 4 hydroxyl groups capable of reacting with NCO groups and having a
- 30 molecular weight of from 32 to 6000

wherein the sum of the %'s by weight of (A), (B) and (C) total 100% by weight.

2. A storage-stable, liquid, partially trimerized and allophanized polyisocyanate according to Claim 1, wherein the storage-stable, liquid, partially trimerized polyisocyanate composition has an NCO group content of about 17 to about 39% by weight, and comprises:
- (A) from 10 to 80% by weight of toluene diisocyanate having an isomer distribution of:
- (1) from 60 to 100% by weight of the 2,4-isomer, and
- (2) from 0 to 40% by weight of the 2,6-isomer, with the sum of the %'s by weight of (A)(1) and (A)(2) totaling 100% by weight of (A);
- and
- (B) from 10 to 80% by weight of a polyisocyanate of the diphenylmethane series comprising from:
- (1) 0 to 50% by weight of higher functionality polyisocyanates of the diphenylmethane series,
- (2) 40 to 100% by weight of 4,4'-diphenylmethane diisocyanate,
- (3) 0 to 20% by weight of 2,4'-diphenylmethane diisocyanate,
- and
- (4) 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,
- with the sum of the %'s by weight of (B)(1), (B)(2), (B)(3) and (B)(4) totaling 100% by weight of (B);
- and
- (C) from 0.1 to 10% by weight of an organic compound or mixture thereof containing from 1 to 4 hydroxyl groups

capable of reacting with NCO groups and having a molecular weight of from 32 to 6000;

wherein the sum of the %'s by weight of (A), (B) and (C) total 100% by weight.

5           3.     A storage-stable, liquid, partially trimerized and allophanized polyisocyanate according to Claim 1, wherein (C) is an aliphatic alcohol having from 1 to 36 carbon atoms or an aromatic alcohol having from 5 to 20 carbon atoms.

10           4.     A storage-stable, liquid, partially trimerized and allophanized polyisocyanate according to Claim 3, wherein (C) is chosen from at least one of methanol, ethanol, 1,2-ethanediol, 1-propanol, 2-propanol, 1-butanol, isobutyl alcohol, 2-butanol, n-amyl alcohol, sec-amyl alcohol, tert-amyl alcohol, 1-ethyl-1-propanol, n-hexanol and isomers thereof, n-octyl alcohol, 2-octyl alcohol, 2-ethyl-1-hexanol, n-decyl alcohol, n-dodecyl  
15 alcohol, neopentylglycol, n-tetradecyl alcohol, n-hexadecyl alcohol, n-octadecyl alcohol, 1,2 and 1,3-propanediol, 1,4-butanediol, 1,3-butanediol, 2,3-butanediol, 3-methyl-2-butanol, 3,3-dimethyl-1-butanol, 2-ethyl-1,3-hexanediol, glycerol, 1,2,4-butanetriol, pentaerythritol, diethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol and phenol.

20           5.     A storage-stable, liquid, partially trimerized and allophanized polyisocyanate according to Claim 4, wherein (C) is isobutyl alcohol.

          6.     A process for the preparation of a storage-stable, liquid, partially trimerized and allophanized polyisocyanate composition containing isocyanurate groups and having an NCO group content of  
25 about 15 to about 41% by weight, comprising:

(1)     partially trimerizing and allophanizing:

(A)     from 5 to 85% by weight of toluene diisocyanate having an isomer distribution of:

30           (1)     from 60 to 100% by weight of the 2,4-isomer,  
          and

- (2) from 0 to 40% by weight of the 2,6-isomer, with the sum of the %'s by weight of (A)(1) and (A)(2) totaling 100% by weight of (A);
- and
- 5 (B) from 5 to 85% by weight of a polyisocyanate of the diphenylmethane series comprising from:
- (1) 0 to 50% by weight of higher functionality polyisocyanates of the diphenylmethane series,
- 10 (2) 40 to 100% by weight of 4,4'-diphenylmethane diisocyanate,
- (3) 0 to 20% by weight of 2,4'-diphenylmethane diisocyanate,
- and
- (4) 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,
- 15 with the sum of the %'s by weight of (B)(1), (B)(2), (B)(3) and (B)(4) totaling 100% by weight of (B);
- and
- 20 (C) from 0.1 to 10% by weight of an organic compound or mixture thereof containing from 1 to 4 hydroxyl groups capable of reacting with NCO groups and having a molecular weight of from 32 to 6000;
- wherein the sum of the %'s by weight of (A), (B) and (C) total 100% by weight.
- 25 in the presence of:
- (C) at least one trimerization catalyst and optionally at least one allophanation catalyst,
- followed by the addition of:
- (D) an acidic stopper.

7. The process of Claim 6, wherein the storage-stable, liquid, partially trimerized and allophanized polyisocyanate composition has an NCO group content of about 17 to about 39% by weight, and comprises:

(A) from 10 to 80% by weight of toluene diisocyanate having an isomer distribution of:

(1) from 60 to 100% by weight of the 2,4-isomer, and

(2) from 0 to 40% by weight of the 2,6-isomer, with the sum of the %'s by weight of (A)(1) and (A)(2) totaling 100% by weight of (A);

and

(B) from 10 to 80% by weight of a polyisocyanate of the diphenylmethane series comprising from:

(1) 0 to 50% by weight of higher functionality polyisocyanates of the diphenylmethane series,

(2) 40 to 100% by weight of 4,4'-diphenylmethane diisocyanate,

(3) 0 to 20% by weight of 2,4'-diphenylmethane diisocyanate,

and

(4) 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,

with the sum of the %'s by weight of (B)(1), (B)(2), (B)(3) and (B)(4) totaling 100% by weight of (B);

and

(C) from 0.1 to 10% by weight of an organic compound or mixture thereof containing from 1 to 4 hydroxyl groups capable of reacting with NCO groups and having a molecular weight of from 32 to 6000

wherein the sum of the %'s by weight of (A), (B) and (C) total 100% by weight.

8. A process according to Claim 6, wherein (C) is an aliphatic alcohol having from 1 to 36 carbon atoms or an aromatic alcohol having from 5 to 20 carbon atoms.

9. A process according to Claim 8, wherein (C) is chosen from  
5 at least one of methanol, ethanol, 1,2-ethanediol, 1-propanol, 2-propanol, 1-butanol, isobutyl alcohol, 2-butanol, n-amyl alcohol, sec-amyl alcohol, tert-amyl alcohol, 1-ethyl-1-propanol, n-hexanol and isomers thereof, n-octyl alcohol, 2-octyl alcohol, 2-ethyl-1-hexanol, n-decyl alcohol, n-dodecyl alcohol, neopentylglycol, n-tetradecyl alcohol, n-hexadecyl alcohol, n-  
10 octadecyl alcohol, 1,2 and 1,3-propanediol, 1,4-butanediol, 1,3-butanediol, 2,3-butanediol, 3-methyl-2-butanol, 3,3-dimethyl-1-butanol, 2-ethyl-1,3-hexanediol, glycerol, 1,2,4-butanetriol, pentaerythritol, diethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol and phenol.

10. A process according to Claim 9, wherein (C) is isobutyl  
15 alcohol.

11. A storage-stable, liquid prepolymer containing a mixed trimer and allophanate of toluene diisocyanate, a polyisocyanate of the diphenylmethane series and an organic compound, having an NCO group content of about 8 to about 39%, and comprising the reaction product of:  
20 (I) the liquid, partially trimerized and allophanized polyisocyanate of Claim 1,  
and  
(II) an organic component containing from about 1.5 to about 4  
hydroxyl groups which are capable of reacting with NCO groups,  
25 and having a molecular weight of from about 76 to about 6,000.

12. The storage-stable, liquid prepolymer of Claim 11, wherein (II) said organic component contains from about 1.8 to 3 hydroxyl groups and has an molecular weight of about 76 to about 4,800.

13. The storage-stable, liquid prepolymer of Claim 11, wherein  
30 (II) said organic component comprises a polyether polyol having an

equivalent weight of at least about 900 and containing at least about 10% by weight of ethylene oxide, based on 100% by weight of alkylene oxide.

14. The storage-stable, liquid prepolymer of Claim 11, wherein the NCO group content is from about 20 to about 35%.

5 15. A process for the production of a storage-stable, liquid prepolymer having an NCO group content of about 8 to about 39%, containing a mixed trimer and allophanate of toluene diisocyanate, a polyisocyanate of the diphenylmethane series and an organic compound, comprising:

10 reacting

(I) the liquid, partially trimerized polyisocyanate produced by the process of Claim 6,

with

15 (II) an organic component containing from about 1.5 to about 4 hydroxyl groups which are capable of reacting with NCO groups and having a molecular weight of from about 76 to about 6,000.

16. The process of Claim 15, wherein (II) said organic component contains from about 1.8 to about 3 hydroxyl groups and has a  
20 molecular weight of about 76 to about 4,800.

17. The process of Claim 16, wherein (II) said organic component comprises a polyether polyol having an equivalent weight of at least about 900 and containing at least about 10% by weight of ethylene oxide, based on 100% by weight of alkylene oxide.

25 18. The process of Claim 15, wherein the NCO group content is from about 20 to about 35%.

19. A process for preparing a storage-stable, liquid, partially trimerized and allophanized polyisocyanate composition containing isocyanurate groups and having an NCO group content of about 15 to  
30 about 41% by weight, comprising:

(1) partially trimerizing and allophanizing:

- (A) from 5 to 85% by weight of toluene diisocyanate having an isomer distribution of:
- 5 (1) from 60 to 100% by weight of the 2,4-isomer, and
- (2) from 0 to 40% by weight of the 2,6-isomer, with the sum of the %'s by weight of (A)(1) and (A)(2) totaling 100% by weight of (A);
- and
- 10 (B) from 5 to 85% by weight of a polyisocyanate of the diphenylmethane series comprising from:
- (1) 0 to 50% by weight of higher functionality polyisocyanates of the diphenylmethane series,
- (2) 40 to 100% by weight of 4,4'-diphenylmethane diisocyanate,
- 15 (3) 0 to 20% by weight of 2,4'-diphenylmethane diisocyanate,
- and
- (4) 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,
- 20 with the sum of the %'s by weight of (B)(1), (B)(2), (B)(3) and (B)(4) totaling 100% by weight of (B);
- and
- (C) from 0.1 to 10% by weight of an organic compound or mixture thereof containing from 1 to 4 hydroxyl groups
- 25 capable of reacting with NCO groups and having a molecular weight of from 32 to 6000;
- wherein the sum of the %'s by weight of (A), (B) and (C) total 100% by weight.
- in the presence of:
- 30 (C) at least one trimerization catalyst and optionally at least one allophanation catalyst,
- followed by the addition of:



- (D) an acidic stopper; and
- (2) blending
- (E) a polyisocyanate of the diphenylmethane series comprised from:
  - 5 (1) 0 to 50% by weight of higher functionality polyisocyanates of the diphenylmethane series,
  - (2) 30 to 60% by weight of 4,4'-MDI,
  - (3) 3 to 60% by weight of 2,4'-MDI; and
  - (4) 0 to 6% by weight of 2,2'-MDI; or
- 10 (F) a uretonimine modified polyisocyanates of the diphenylmethane series comprised from:
  - (1) 34 to 100% by weight of 4,4'-MDI,
  - (2) 0 to 60% by weight of 2,4'-MDI, and
  - (3) 0 to 6% by weight of 2,2'-MDI.

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